

Compositional Studies of Primitive Asteroids

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Strategy

The aqueous alteration history in the solar system will be studied through acquiring additional CCD reflectance spectra in the blue-UV through near-infrared (0.4 - 1.0 μm) spectral region and analyzing these spectra for information about iron oxides in phyllosilicates identified in the CM and CI carbonaceous chondrites. Emphasis will be on the main-belt and Cybele primitive asteroids, as these asteroids show spectral diversity and are also spectral analogues for known meteorite samples. The porphyrin bands found in organics near 0.4 μm will also be sought.

Progress and Accomplishments

During 1990, additional CCD reflectance spectra of main-belt C-class asteroids and some outer-belt asteroids were acquired. Spectra already acquired have been examined for changes in absorption strength and shape which occur with heliocentric distance. Sources of error which may affect broadband photometry but which can be delineated in narrowband spectrophotometry have also been studied. Spectra of Martian satellites Phobos and Diemos have been acquired and are being analyzed.

Projected Accomplishments

The data base of CCD spectra of primitive asteroids will continue to be enlarged, shifting the emphasis to the main-belt and Cybele primitive asteroids, and extending the spectral coverage to shorter wavelengths. Detail in the spectra of these asteroids will reveal more of the history of aqueous alteration in the solar system. An observational search for the porphyrin bands near 0.4 μm will be conducted.

Publications

Vilas, F. and Gaffey, M. J. (1989) "Phyllosilicate Absorption Features in Main-Belt and Outer-Belt Asteroid Reflectance Spectra", Science, 246, 790.

Vilas, F., and McFadden, L. A. (1990) "CCD Reflectance Spectra of Selected Asteroids", LPSC XXI, 1272.

Vilas, F. and Larson, S. M. (1990) "The Continued Search for Aqueous Alteration Products Among the Primitive Asteroids", BAAS, 22, 1125.